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Meta-Analysis of UNL Feedlot Trials Replacing Corn with WDGS

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Summary

A meta-analysis of UNL feedlot trials replacing dry-rolled or high-moisture corn with wet distillers grains plus solubles (WDGS) indicated WDGS fed between 15% to 40% of diet DM was 130% the feeding value of corn. Feed: Gain, ADG, marbling score, and fat thickness responded quadratically as WDGS inclusion increased. In most cases, performance and carcass characteristics improved up to 30% to 40%, then gradually decreased. Feeding WDGS up to 40% of diet DM improved performance and quality grade.

Introduction

Previous UNL feedlot research indicated an increased feeding value of WDGS relative to dry-rolled corn. However, the increased feeding value of WDGS was dependent on inclusion level and method of corn processing used in the diet. In addition, the impact of WDGS inclusion level on quality grade was not summarized.

A Meta-analysis is used to account for individual trial variation on the combined results of multiple studies. Therefore the objective of this Meta-analysis was to evaluate the effect of WDGS dietary inclusion level of diets containing dry-rolled or high-moisture corn on feedlot cattle performance and carcass characteristics.

Procedure

Treatment means (n = 34) from University of Nebraska ARDC research feedlot experiments evaluating the use of WDGS in finishing diets were compiled (*1993 Nebraska Beef Report,* pp. 43-46; *1994 Nebraska Beef Report*, pp. 38-40; *1999 Nebraska Beef Report,* pp. 32-33; *2004 Nebraska Beef Report,* pp. 45-48; *2006 Nebraska Beef Report,* pp. 51-53; *2007 Nebraska Beef Report,* pp. 25-26; *2007 Nebraska Beef Report,* pp. 33-35; *2008 Nebraska Beef Report,* pp. 60-62). Steers (n = 1,257) in these studies were predominantly black, crossbred steer calves or yearlings. Within experiment, cattle were blocked by initial BW, allocated randomly to pens, then pens assigned randomly to dietary treatments. Only studies that replaced dry-rolled corn, high-moisture corn, or a combination of the two types of corn with corn WDGS (0% to 50% of diet DM) were included in the analysis. Wet DGS also replaced CP in the diet if CP needs were met by byproduct inclusion level. All finishing diets contained 5% to 7.5% roughage (DM basis).

Steers in these experiments were fed for 99 to 168 days. In each individual experiment, cattle were fed the same number of days and marketed at a commercial abattoir. Hot carcass weight was recorded on day of slaughter. Fat thickness was measured after a 24 to 48-hour chill. USDA Marbling score was called by a professional USDA grader, where 500 = Small^0. Final BW, ADG, and F:G were calculated based on hot carcass weights adjusted to a common trial dressing percentage of 62% or 63%. The feeding value of WDGS at different inclusion levels was calculated using feed efficiency. The difference between each WDGS treatment and the individual experiment control diet (0% WDGS) was calculated, divided by the feed efficiency value of the control treatment, as well as the percentage of WDGS in the individual diet to give a feeding value of WDGS relative to feeding corn.

An iterative meta analysis methodology was used to integrate quantitative findings from multiple studies using the PROC MIXED procedure of SAS.

Results

Replacement of grain with WDGS consistently improved F:G (Table 1). The feeding value of WDGS was consistently higher than corn and suggests a 30% improvement in feeding value when WDGS replaced 15%

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Table 1. Finishing steer performance when fed different dietary inclusions of wet distillers grains plus solubles (WDGS).

WDGS Inclusion[a]:	0WDGS	10WDGS	20WDGS	30WDGS	40WDGS	50WDGS	Lin[b]	Quad[b]	Cubic[b]
DMI, lb/day	22.3	22.7	22.8	22.5	21.8	20.8	0.01	0.01	0.75
ADG, lb	3.47	3.70	3.83	3.87	3.81	3.66	< 0.01	< 0.01	0.30
F:G	6.44	6.16	5.95	5.81	5.74	5.73	< 0.01	0.09	0.39
12th rib fat, in	0.49	0.54	0.55	0.53	0.52	0.55	< 0.01	0.04	0.06
Marbling score [c]	518	528	533	532	526	514	0.05	0.05	0.36
Feeding value, % [d]	100	155	131	130	131	113	0.01	0.03	0.05

[a]Dietary treatment levels (DM basis) of wet distillers grains plus solubles (WDGS), 0WDGS = 0% WDGS, 10WDGS = 10% WDGS, 20WDGS = 20% WDGS, 30WDGS = 30% WDGS, 40WDGS = 40% WDGS, 50WDGS = 50% WDGS.
[b]Estimation equation linear, quadratic, and cubic term t-statistic for variable of interest response to WDGS level.
[c]500 = Small^0.
[d]Percent of corn feeding value, calculated from individual trial treatment mean feed conversion relative to individual trial 0WDGS feed conversion, divided by WDGS inclusion.

to 40% of the diet. The feeding value at low levels (less than 15%) was approximately 160% the feeding value of corn. When higher levels of WDGS were used (greater than 40%), the feeding value was still greater than corn, but less than when intermediate levels of WDGS were fed. The increase in feeding value was due to improvements in ADG when WDGS replaced corn (Figure 3). Because ADG was greater for cattle fed WDGS, carcasses from cattle fed WDGS were fatter, and marbling score increased. The response in ADG and marbling score were significantly quadratic and increased as WDGS inclusion increased to 30% (DM basis) and then decreased. All cattle were sold at one time and carcass characteristics measured. Therefore, if one dietary treatment had a negative impact on performance, then those cattle were less finished (i.e., fat) at the conclusion of the experiment. Likewise, treatments that improved performance resulted in greater carcass fatness due to the same number of days-on-feed within experiments. In conclusion, feeding as much as 40% WDGS increased gain, improved F:G, increased marbling score, as well as increased fat thickness. The increase in fat depth and marbling from feeding byproducts was related to improved F:G and ADG.

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